masibus

User's Manual

PM-2130
THREE PHASE POWER METER

Masibus Automation & Instrumentation Pvt. Ltd.
B/30, GIDC Electronics Estate,
Sector-25, Gandhinagar-382044, Gujarat, India
Ph: 91-079-23287275 -- 79
Fax: 91-079-23287281/82
Email: support@masibus.com
Web: www.masibus.com

PM2130 - Contents

- **Specifications Guide 3**
  - Overview 3
  - Features 3
  - Parameters 3
  - Technical Specification 4
  - Wiring Details 5
  - Mechanical dimensions detail 6
- **Operation Guide 7**
  - Key operation 7
  - Program Mode Operation 7
  - Calibration Procedure 10
- **Serial Guide 11**
  - Parameters for 3-ph 4-wire operation – Real Data type 11
  - Parameters for 3-ph 3-wire operation – Real Data type 12
  - Parameters for 3-ph 4-wire operation – Long Data type 13
  - Parameters for 3-ph 3-wire operation – Long Data type 14

PM2130 - Specifications

PM2130 – OVERVIEW:

The 2130 POWER METER is a solid state Power Meter Which accurately measures all quantities of the supply including all types of energies. The 2130 POWER METER is based on ASIC and Microcontroller, with a high degree of programmability.

The Meter has been programmed to operate as an intelligent front end measuring and storing device and to communicate continuously to a Master, all the data relevant for the purpose of SCADA, through isolated RS-485 port using MODBUS-RTU protocol.

The Meter is normally supplied readily pre-programmed for operation and can be directly installed in the usual manner. The Meter can be read manually or through a Master using MODBUS-RTU Protocol

PM2130 – FEATURES:

- The Hardware of the Meter has been designed to make it light weight, rugged, reliable and safe for the user. The Meter is designed so as to provide **ACCESS TO AUTHORISED USERS** only, by providing data security password.
- The Meter is self-powered & uses SMPS of Universal range 80 to 550V AC
- Front panel **LED Output** for purpose of calibration/Accuracy measurement of selected type of energy like: KWh-Import, KWh-Export, KVARh-Lagging, and KVARh-Leading & KVAh
- 52 Parameters Measurement display on selectable screen
- Meter has **4 x 16 LCD** to display simultaneously various parameters
- **AUTO-SCALING** for measured parameters. (**K**ilo, **M**ega & **G**iga)
- **Four Quadrant** Measurement for PF, Power and Energy.(Active-Reactive)
- **Calibration:** Digital by front panel keys
- **Digital Input & Output:** The Meter has one Pulse Output, which gives Pulse train as per selected energy type. Also Meter takes one Input from Outside and measured value will be displayed on LCD screen
- Meter is also having Relay output feature in which relay is energized after the set value fixed by user. The digital input feature is optional. User can get either Relay output or digital input at a time.
- Digital output for selected energy unit
- Digital input for external energy integration, display & retransmission in RS485
- **Maximum Demand** for both block and sliding window method

PM2130'S PARAMETERS:

		3 Phase 4 Wire				3 Phase 3 Wire			
Parameter	**Unit**	**P1**	**P2**	**P3**	**Tot/Sys/ Avg**	**P1 & P2**	**P1 & P3**	**P3 & P2**	**Tot/Sys/ Avg**
Frequency	Hz				System				System
Power Factor	PF	√	√	√	Average	√		√	Average
Vrms (L-N)	Volt	√	√	√	Average	√	√	√	Average
Irms	Amp	√	√	√	Average	P1	P2	P3	Average
Vrms (L-L)	Volt	1 & 2	2 & 3	3 & 1					
Ineutral	Amp				System				
Watt	Watt	√	√	√	Total	√		√	Total
Var	Var	√	√	√	Total	√		√	Total
VA	VA	√	√	√	Total	√		√	Total
KWh-Import	KWh	√	√	√	Total	√		√	Total
KWh-Export	KWh	√	√	√	Total	√		√	Total
KVARh-Lagging	KVARh	√	√	√	Total	√		√	Total
KVARh-Leading	KVARh	√	√	√	Total	√		√	Total
KVAh	KVAh	√	√	√	Total	√		√	Total
Output	KWh				√				√
Relay / Input	Kw/Kwh				√				√

PM 2130 TECHNICAL SPECIFICATION:

Input

❖ **Nominal Voltage Input**

Direct voltage	: Between 57.8V and 550V
Voltage ranges	: For 3ph4w 63.5/110V, 69.3/120V, 120/208V, 220/380V, 230/400V, 240/415V, 275/476V
Voltage ranges	: For 3ph3w 110V, 120V, 380V, 400V, 415V, 440V, 476V
Accuracy Range	: 50% – 115% of nominal voltage [For 63.5/110V and 69.3/120V, 63% – 115% of Nominal Voltage]
Burden	: < 2.5 VA per phase
Overload	: 1.2x Nominal (Continuous)
PT Ratio	: 1 to 9999.999 Programmable
Wire gauge	: 12 AWG

❖ **Nominal Input Current**

Nominal Current	: 1 or 5 Amp.
Accuracy Range	: 5% – 120% nominal
Burden	: < 0.5 VA per phase
Overload	: 20.0 Amp Max. (Continuous)
CT Ratio	: 1 to 9999.999 Programmable
Wire gauge	: 12 AWG

❖ **Starting current**

0.4% of nominal Current. (Class 1.0)

❖ **Frequency**

50Hz / 60Hz range ± 5.0Hz

System

Single Phase
3 phase 3 wire balanced-unbalanced load
3 phase 4 wire balanced-unbalanced load

Accuracy: (Class 1)

[Given Accuracy is for PF: 0.5Lag-1.0-0.8Lead]

Volt	: 1% rdg ±1 dgt.
Current	: 1% rdg ±2 dgts.
Frequency	: 0.1Hz ±1 dgt.
Power Factor	: 1% rdg ±2 dgts (0.5 Lag - 1.0 - 0.8 Lead)
Active Power	: 1% rdg ±2 dgts.
Reactive Power	: 2% rdg ±2 dgts.
Apparent Power	: 1% rdg ±2 dgts.
Active Energy	: Class 1.0 (IS 13779/IEC 1036)
Reactive Energy	: Class 2.0 (IEC 1268)
Apparent Energy	: Cass 1.0
Max Demand	: 1% rdg ±2 dgts

Output Relay

Type	: Watt/VAR/VA - SPNO
Rating	: 250V, 2A (AC)
	: ±30V, 2A (DC)

Pulse Output

Type	: Wh/VARh/Vah - SPNO
Rating	: 200V, 100mA, Resistive (AC)
	: ±200V, 100mA, Resistive (DC)
Pulse Rate	: 1 to 9999 pulses per selected type
Pulse duration	: 80 mSec ± 10%

Maximum Demand

Method : block or sliding methods programmable

Burden

Less than 5 VA

Communication Output

Serial port	: RS485 Multidrop
Baud rate	: Selectable. 4800/9600/19200
Start bit	: 1
Stop bit	: 1
Protocol	: MODBUS – RTU
Isolation	: 2KV

Environmental

Working temperature	: 0 to 55 ºC
Storage temperature	: -10 to 70 ºC
Temperature Coeff	: IS-13779
Relative humidity	: 30 - 95% non-condensate
Warm up time	: 5 min

Miscellaneous

Display	: 4X16 Backlight LCD module with 4.75mm Character height
Update Rate	: 320ms
Sensing Method	: True RMS sensing on all channels (Simultaneous)

Enclosure

Mounting	: Panel mounting
Cut-Out	: 90 mm x 90 mm
Enclosure	: 96 x 96 x 74.4 mm
Material	: ABS
Accessory	: 2 Panel mount clamps
Weight	: 0.5 Kg

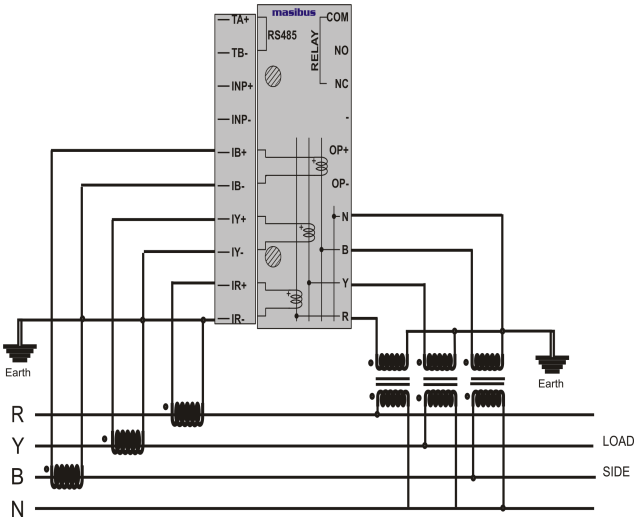
Resolution for Energy parameters

Display Format	Unit	Last Digit Resolution
X.XXXX	K	0.1 W
XX.XXXX	K	0.1 W
XXX.XXXX	K	0.1 W
X.XXXXXX	M	1 W
XX.XXXXX	M	10 W
XXX.XXXX	M	100 W
X.XXXXXX	G	1 KW
XX.XXXXX	G	10 KW
XXX.XXXX	G	100 KW

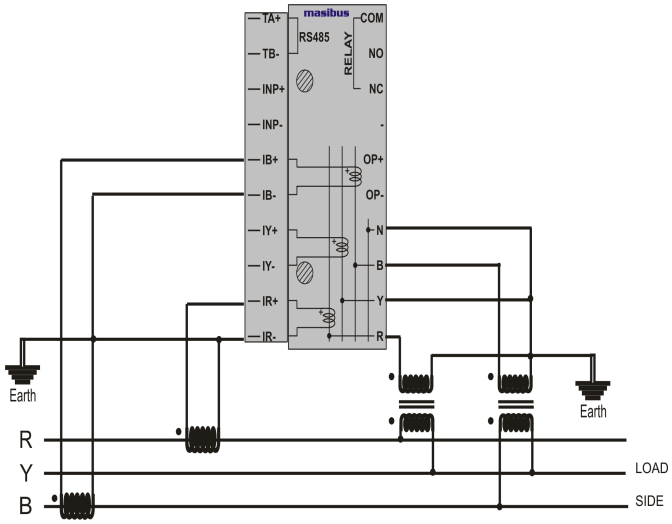
PM2130 – WIRING DETAILS:

The connections have to be made as suggested in the diagram.

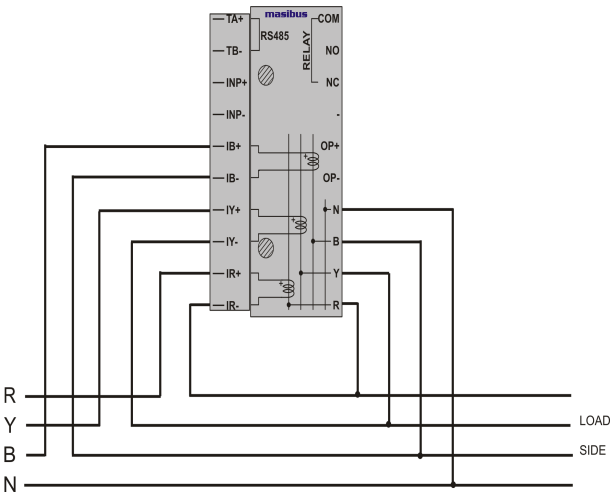
3 PT – 3 CT Configuration: (For 3 Phase 4 Wire Supply)



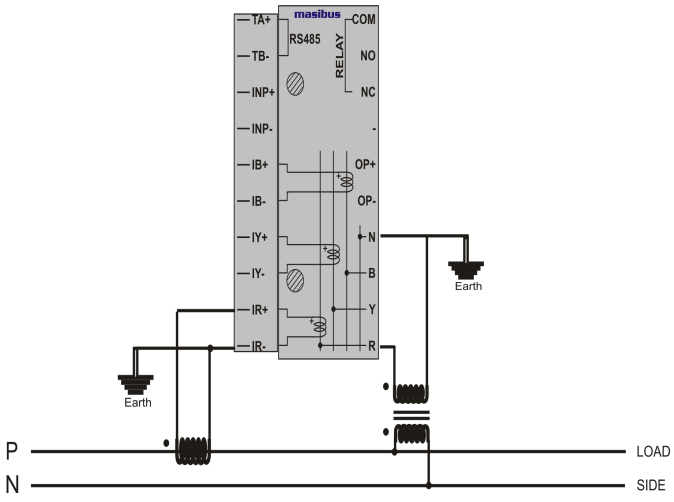
2 PT – 2 CT Configuration: (For 3 Phase 3 Wire Supply)



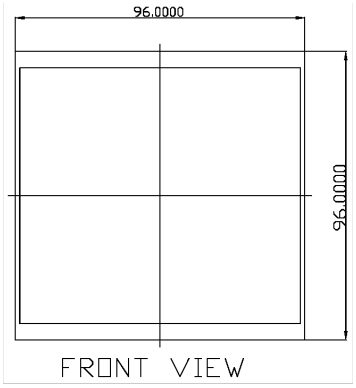
Direct Connection Configuration: (For 3 Phase 4 Wire Supply)

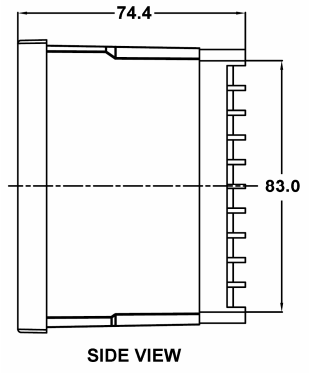


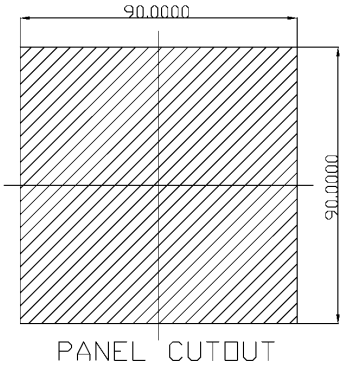
1 PT – 1 CT Configuration: (For single Phase Supply)



PM2130 – Mechanical Dimension Detail:







(All Dimensions are in mm.)

Notes:

Before installing the meter, please go through….

1. Confirm the connection configuration
2. Confirm that all energy parameters are going to start from zero, if not, make them zero.
3. Apply Proper CT – PT Ratio as per requirement.
4. Select Energy type for LED Blinking as per your requirement.
5. Confirm that Meter is calibrated.
6. For Serial communication, MODBUS-RTU, RS485, you will get real/long data from measurement.
7. Factory set Password to access the Program mode is 0001.
8. Some parameters in configuration are only for factory purposes so please don't disturb these parameters like Vrated, Irated & System.
9. For 3p3w system, Display Menu will be changed and for modbus communication, follow the address map for 3p3w.Program mode will be same.
10. For Front Blinking LED, select energy type (i.e.-import/KWh-export/KVARh-lag/KVARh-lead /KVAh/MWh-Import/MWh-Export/MVARh-Lag/MVARh-Lead/MVAh) as per your requirement using Program mode, from OUTPUT and set the value of constant. But here you can get maximum output pulse frequency (& LED Blinking rate) up to 320 ms.so whenever you are using this feature, you should set value of Meter-Constant such a way so it will not cross the limit of 320 ms pulse frequency.
11. For Digital Input Feature, you have to program value of constant – IN1/Unit and for Unit you can select Kilo or Mega.
12. When data type selected for modbus is LONG, Total apparent Energy will overflow from 200GVAhr the meter will auto reset all energy parameter. This includes Active import and export energy, Reactive lead and lag energy and apparent energy. Such condition of overflow occurrence is depending on CT Ration and PT ratio.
    Example: For 110V V rated, and 1 A I rated power meter is set for 100A and 66KV line with CT Ratio of 100 and PT Ratio of 600.
    Energy consumed per hour will be 66kV X 100Amps = 6600KVAHr.
    Time to overflow in Hr. = 200GVAhr / 6600KvaHr = 30303 Hr
    Days = 30303 /24 = 1262 Days
    Years = 1262 / 365 = 3.45 Years / Total of Three Phase.
13. User has to manually reset all the energy parameter when installing the meter first time.
14. Resolution of the energy parameter on the Modbus when data is transmitted in LONG format is 100VAhr/Whr/VARhr rather than 1VAhr/Whr/VARhr, which is possible when FLOAT data type is used. Because of the limitation of the Long Data type and to avoid frequent reset, Data is transmitted in with above-mentioned resolution.
    Due to this resolution on display of the Meter will not be same as ON ModBus data, when data is transmitted in LONG format. Multiplication factor given on master side is 0.0001.
    Example: Lets say on modbus data transmitted is 20098798 then on the master side it will be 20098798*0.0001 = 2009.8798 MWhr/MVAhr/MVARhr.
    which gives the resolution of the 0.1Khr/KAhr/KARhr as described above.
15. For Enter CT ratio and Pt ratio.
    Example: FOR enter value CTR : 1234.567
    Convert 1234567 in to hex.so hex value is 12D687.
    Now enter lower four byte (D687) at 40111 address.
    After it Higher four byte (0012) at 40110 address.

PM2130 - Operation

KEY OPERATION OF 2130:

The PGM Key/Enter Key is basically used for PROGRAM mode of operation of 2130.

The RIGHT SHIFT Key is used to move from one frame of display to another in Horizontal direction in the RUN Mode. In the PROGRAM Mode of operation it also acts as an ESC Key.

The UP/DOWN Key is used to move from one frame to frame in Vertical direction in RUN Mode. In the PROGRAM Mode, it is used to move from Line to line on display with arrow curser and also modify the value of programmable parameters.

Front LED indication depicts blinking rate of selected energy consumption by load as per selected constant, PULSE/Unit.

The 2130 basically operate in two modes: The **RUN** (Normal) Mode and the **PROGRAM** Mode. The entire operation is shown in brief in the flow diagram below.

PROGRAM MODE:

The PROGRAM Mode can be entered by pressing the PGM key. Once the key is pressed, the unit prompts for four digit password to enter the programming mode.

1. A.C.INPUTS

Now here four parameters are available: CT RATIO, PT RATIO, Vrate and Irate. **Here you don't have to change Vrate and Irate parameters because they are only factory purpose. Only factory person can change them, so don't try to change them.**

2. PLS IN-OUT

For digital Input, set INPUT1 with its unit, either Kilo or Mega & for digital Output, set OUTPUT with it's unit. For example: - you have set INPUT1 as 3600 with it's unit Kilo, so it means that if meter is getting 3600 pulses at Input connection, corresponding reading will be 1 Kh.

Digital Output is meter constant for energy pulse output. Suppose you have set 3600 with its unit KWh-I, so it means that for 1 KWh of consumption of Active-Import Energy by load, it will give 3600 pulses for 1 hour. Here in

unit many options are available like:KWh-I (Active-Import), KWh-E (Active-Export), KVArL (Reactive-Lagging), KVArC (Reactive-Leading) & KVAh (Apparent). These all are for kilo unit, and for mega unit: MWh-I,MWh-E,MVArL,MVArC & MVAh.

3. SERL COMM.

Here three parameters are available: BAUD, SLV ID and DATA TYPE. BAUD is for Baud-Rate and SLV ID is for Slave Address of Meter for Modbus-RTU (Master-Slave) communication while DATA TYPE decides the data type in which the meter sends data on RS-485 line. BAUD has three options like 04800,09600 and 19200 , SLV ID should be between 0 and 247 and DATA TYPE has two option REAL (Float) and LONG .

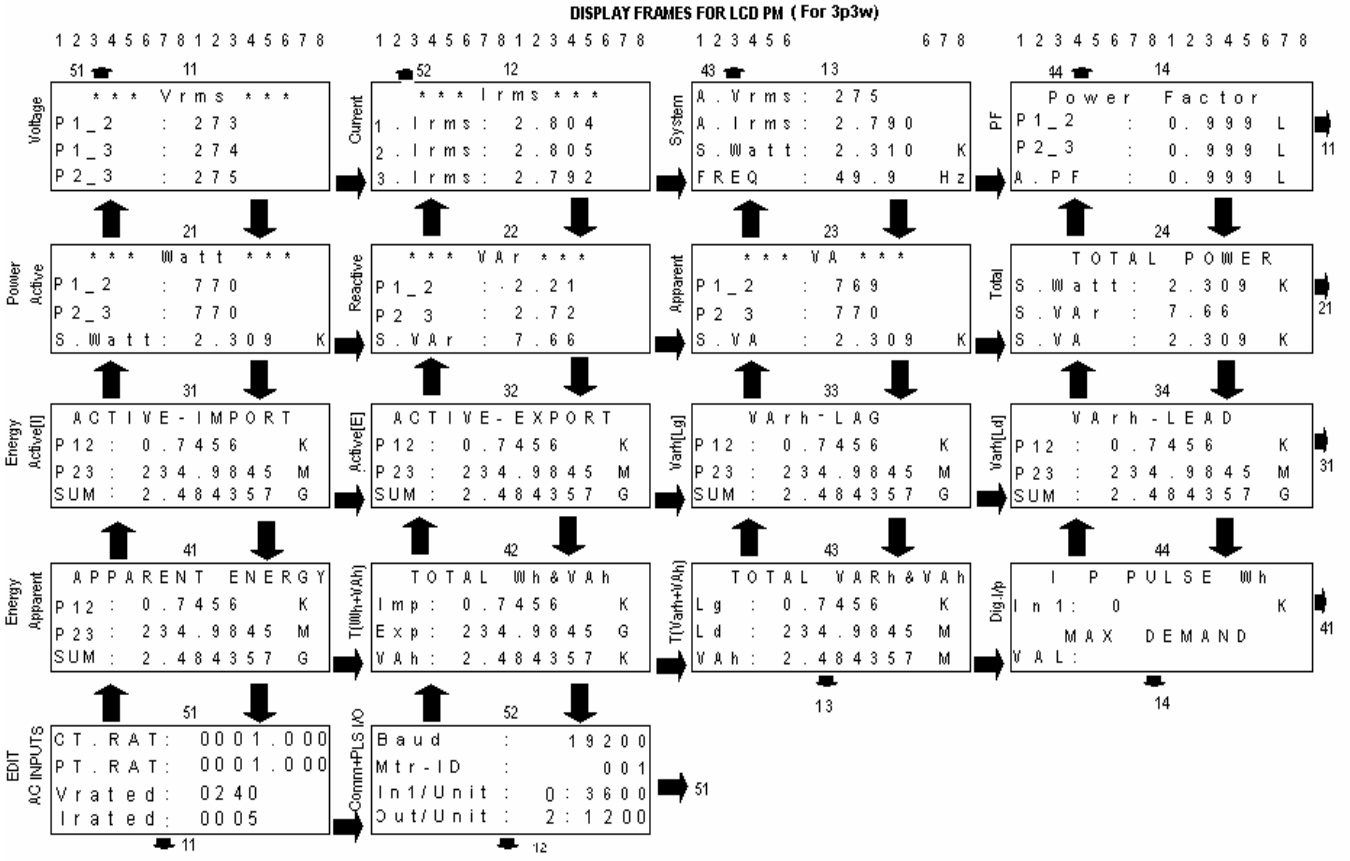
4. METER ADRS

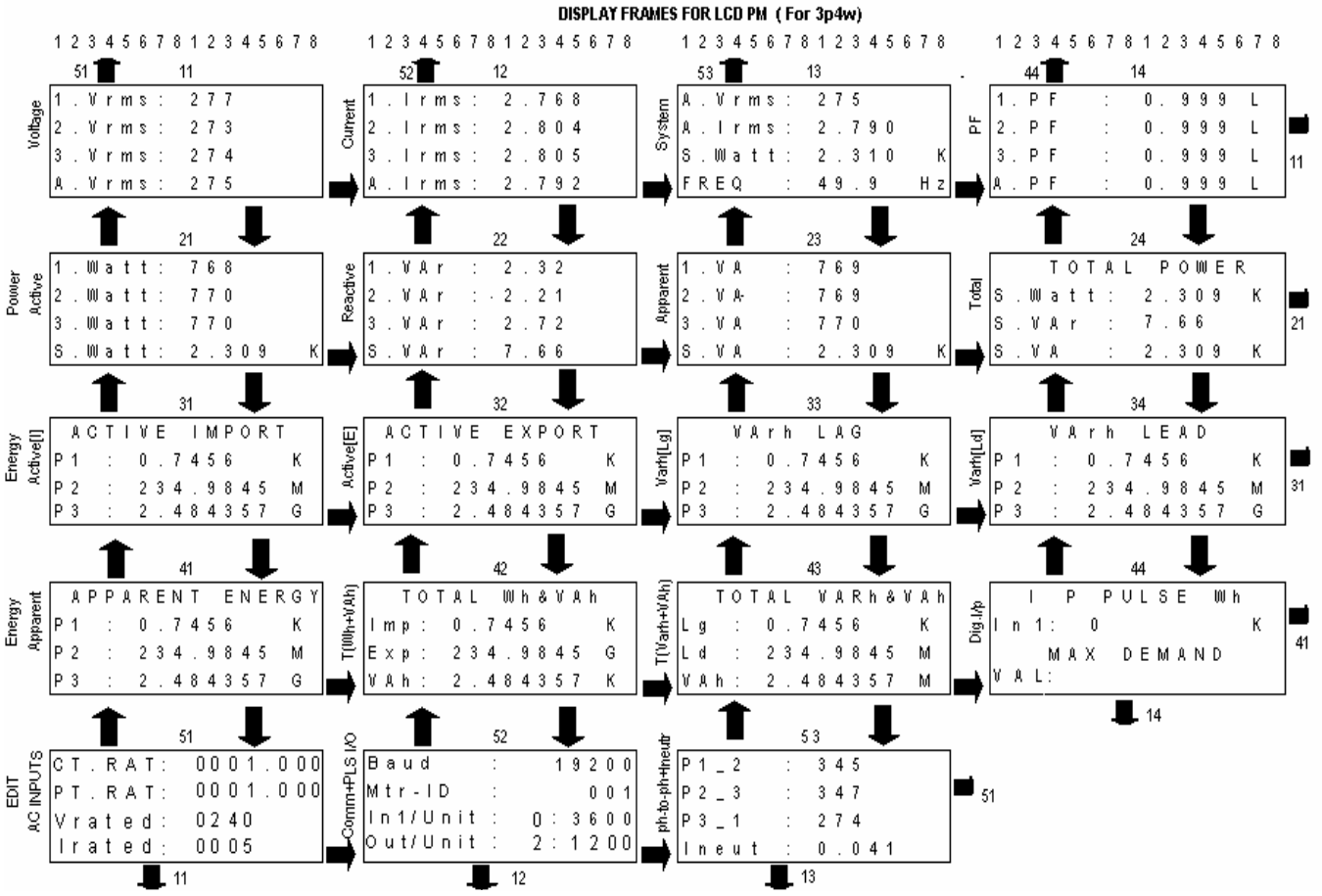
Here two parameters are available like: PSWRD and SYSTEM.PSWRD is for four digit password to security purpose. SYSTEM is used to whether meter is for 3 phase 4 wire AC Power supply or for 3 phase 3 wire AC power supply. **SYSTEM is only for factory purpose; so don't try to change it. If by chance you have set different than set by Factory, again make it as per factory setting.**

5. MAX DEMAND

Here four configuration parameters are available: TYPE, METHOD, In. TIME and Sb. TIME. TYPE is for the type of demand say KW or KVA or KVAr. Enter in it using PGM key and use UP or DOWN keys to select the options and after that use PGM key to store that option. METHOD is for to select the method either BLOCK or SLID (sliding window or moving window). Use UP or DOWN key to select the method and PGM key to store the selected option. Next is In. TIME that is integration time and Sb. TIME that is sub integration time. For both the limits are from 1 to 60 minutes.

In **BLOCK** method enter only integration time. Say if the integration time is 15 minutes then value of max demand will be updated at every 15 minutes. Demand is calculated by algebraically adding the powers. Integration time continues on poweron. i.e. if time is 30 minutes and after 20 minutes power fails then in the next power ON, the power is accumulated for the next 10 minutes and then demand is computed.
Now in **SLIDING** method (moving window) enter integration and sub integration time. Here the division Int. Time / Sub int. Time must be **an integer** and must be **less than 12** (< 12).


DISPLAY FRAMES FOR LCD PM (For 3p3w)
Voltage
*** Vrms ***
P1_2 : 273
P1_3 : 274
P2_3 : 275
Current
*** Irms ***
1.Irms : 2.804
2.Irms : 2.805
3.Irms : 2.792
System
A.Vrms : 275
A.Irms : 2.790
S.Watt : 2.310 K
FREQ : 49.9 Hz
PF
Power Factor
P1_2 : 0.999 L
P2_3 : 0.999 L
A.PF : 0.999 L
Power Active
*** Watt ***
P1_2 : 770
P2_3 : 770
S.Watt : 2.309 K
Reactive
*** VAr ***
P1_2 : 2.21
P2_3 : 2.72
S.VAr : 7.66
Apparent
*** VA ***
P1_2 : 769
P2_3 : 770
S.VA : 2.309 K
Total
TOTAL POWER
S.Watt : 2.309 K
S.VAr : 7.66
S.VA : 2.309 K
Energy Active[I]
ACTIVE-IMPORT
P12 : 0.7456 K
P23 : 234.9845 M
SUM : 2.484357 G
Active[E]
ACTIVE-EXPORT
P12 : 0.7456 K
P23 : 234.9845 M
SUM : 2.484357 G
Varh[Lg]
VArh-LAG
P12 : 0.7456 K
P23 : 234.9845 M
SUM : 2.484357 G
Varh[Ld]
VArh-LEAD
P12 : 0.7456 K
P23 : 234.9845 M
SUM : 2.484357 G
Energy Apparent
APPARENT ENERGY
P12 : 0.7456 K
P23 : 234.9845 M
SUM : 2.484357 G
T(Wh+VAh)
TOTAL Wh&VAh
Imp : 0.7456 K
Exp : 234.9845 G
VAh : 2.484357 K
T(Varh+VAh)
TOTAL VARh&VAh
Lg : 0.7456 K
Ld : 234.9845 M
VAh : 2.484357 M
Dig.I/p
I P PULSE Wh
In1: 0 K
MAX DEMAND
VAL:
EDIT AC INPUTS
CT.RAT: 0001.000
PT.RAT: 0001.000
Vrated: 0240
Irated: 0005
Comm+PLS I/O
Baud : 19200
Mtr-ID : 001
In1/Unit : 0:3600
Out/Unit : 2:1200


DISPLAY FRAMES FOR LCD PM (For 3p4w)
Voltage
1.Vrms : 277
2.Vrms : 273
3.Vrms : 274
A.Vrms : 275
Current
1.Irms : 2.768
2.Irms : 2.804
3.Irms : 2.805
A.Irms : 2.792
System
A.Vrms : 275
A.Irms : 2.790
S.Watt : 2.310 K
FREQ : 49.9 Hz
PF
1.PF : 0.999 L
2.PF : 0.999 L
3.PF : 0.999 L
A.PF : 0.999 L
Power Active
1.Watt : 768
2.Watt : 770
3.Watt : 770
S.Watt : 2.309 K
Reactive
1.VAr : 2.32
2.VAr : 2.21
3.VAr : 2.72
S.VAr : 7.66
Apparent
1.VA : 769
2.VA : 769
3.VA : 770
S.VA : 2.309 K
Total
TOTAL POWER
S.Watt : 2.309 K
S.VAr : 7.66
S.VA : 2.309 K
Energy Active[I]
ACTIVE IMPORT
P1 : 0.7456 K
P2 : 234.9845 M
P3 : 2.484357 G
Active[E]
ACTIVE EXPORT
P1 : 0.7456 K
P2 : 234.9845 M
P3 : 2.484357 G
Varh[Lg]
VArh LAG
P1 : 0.7456 K
P2 : 234.9845 M
P3 : 2.484357 G
Varh[Ld]
VArh LEAD
P1 : 0.7456 K
P2 : 234.9845 M
P3 : 2.484357 G
Energy Apparent
APPARENT ENERGY
P1 : 0.7456 K
P2 : 234.9845 M
P3 : 2.484357 G
T(Wh+VAh)
TOTAL Wh&VAh
Imp : 0.7456 K
Exp : 234.9845 G
VAh : 2.484357 K
T(Varh+VAh)
TOTAL VARh&VAh
Lg : 0.7456 K
Ld : 234.9845 M
VAh : 2.484357 M
Dig.I/p
I P PULSE Wh
In1: 0 K
MAX DEMAND
VAL:
EDIT AC INPUTS
CT.RAT: 0001.000
PT.RAT: 0001.000
Vrated: 0240
Irated: 0005
Comm+PLS I/O
Baud : 19200
Mtr-ID : 001
In1/Unit : 0:3600
Out/Unit : 2:1200
ph-to-ph+Ineutr
P1_2 : 345
P2_3 : 347
P3_1 : 274
Ineut : 0.041

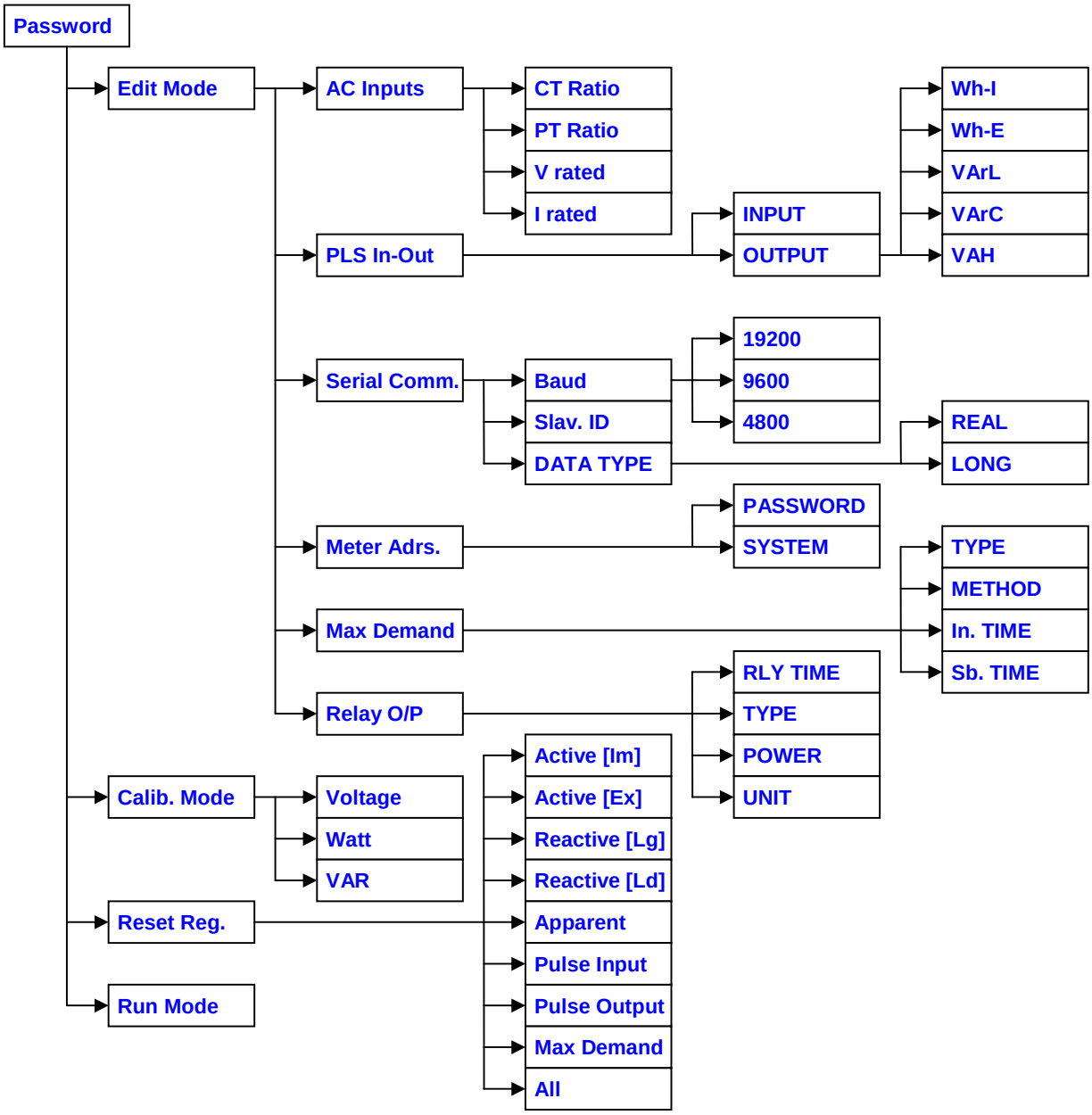


Fig: Programming Mode flow diagram for PM2130.

e.g. Assume a load pattern of following type.

20 kVA	30 kVA	30 kVA	20 kVA
15 mins.	15 mins.	15 mins.	15 mins.
09:00	09:15	09:30	

For sliding window Method: Int. period = 30 mins, Sub Int. period = 15 mins
Demand - 09:00 to 09:30 block = (20*15 + 30*15)/30 = 25 kVA
Demand - 09:15 to 09:45 block = (30*15 + 30*15)/30 = 30 kVA
Demand – 09:30 to 10:00 block = (30*15 + 20*15)/30 = 25 kVA
Max demand at the end of 10:00 = 30 kVA

For block Method: Int. period = 30 mins.
Demand – 09:00 to 09:30 block = (20*15 + 30*15)/30 = 25 kVA
Demand – 09:30 to 10:00 block = (30*15 + 20*15)/30 = 25 kVA
Max demand at the end of 10:00 = 25 kVA

6. RELAY O/P

Here four configuration parameters are available: RLY TIME, TYPE, POWER and UNIT. TYPE is for the type of power say KW or KVA or KVAr. RLY TIME is settable between 1 to 60 seconds.

When the total power crosses the limit which is set by the user and if it is continuously higher then the set value of relay time in seconds then after that time the relay is energized.
As an example if the set value is 100.000 Watts and relay time is 15 seconds. Now if the total power crosses 100 watts then after 15 seconds relay is energized. If the power drops below 100 watts in between then the relay will not be energized.

RESET REGS.

For RESET REGS. Set the arrow before it and press PGM key to enter and screen will be shown like below. By this mode you can reset energy registers. There are seven types of registers like: Active [Im] for Active Import Energy, Active [Ex] for Active Export Energy, Reactive [Lg] for Reactive Lagging Energy, Reactive [Ld] for Reactive Leading Energy, Apparent for Apparent Energy, Pulse Input1 for Digital Input1 and Pulse Input2 for Digital Input2. One menu is for to reset the Max Demand registers. And at the end one option is given to reset all these registers at the same time

CALIBRATION PROCEDURE:

GENERAL:

For power meter 2150 it will be required to calibrate below given parameters
a) Voltage.
b) Active power.
c) Reactive power.

	Vrms		Calib
1.	240	➡	240
2.	230	:	240
3.	235	:	240

Calibration of Voltage Input:

To do calibration of voltage input follows the given steps

- Feed known around 200V A.C voltage at 50 Hz Frequency to the voltage inputs of the meter.
- Press PGM key and enter right password to enter the menu screen.
- Select Voltage Calibration option from CALIB menu.
- After entering the Voltage calibration you will see uncalibrated voltages on left side and the
  Set Calibrate voltage on the right side of the LCD screen. Press PGM Key to enter set the
  Calibrate voltage mode. Now you are in the actual EDIT mode where you can change the Set
  Voltage using UP, DOWN & RIGHT SHIFT key to the known input voltage from the voltage source. After you have set the voltage press PGM key to calculate the calibration factor and store it in the EEPROM. Now you will notice that the uncalibrated voltage on the left side will converge near to the set voltage displayed on the right side of the LCD screen. You can repeat this step till uncalibrated voltage is displayed within accepted limits of set voltage. Most probably it will solve by just first try.
- Repeat the same procedure to calibrate all the three voltage inputs.
- Finally Press RIGHT SHIFT key to return back to main menu.

Note: *Calibration procedure is same for Active power and Reactive Power*

Note for Calibration:

For calibration, given procedure is for 240V/5A rating Meter, But if Meter rating is differ than this then take **Vrms = Vrated** instead of 200V and take **VA = Vrated*Irated** instead of 1000VA in this. Frequency and PF condition should be same.

PM2130 – Serial Guide

MODBUS Register Map for Power Meter PM2130:

3-Phase 4-wire - (REAL)

Read Only Parameters (Function code – 4)

Sr. No.	Address	Measured Para.	Words
1	30,001	Frequency	2
2	30,003	1.PF	2
3	30,005	2.PF	2
4	30,007	3.PF	2
5	30,009	A.PF	2
6	30,011	1.Vrms	2
7	30,013	2.Vrms	2
8	30,015	3.Vrms	2
9	30,017	A.Vrms	2
10	30,019	Vrms1*2	2
11	30,021	Vrms1*3	2
12	30,023	Vrms2*3	2
13	30,025	1.Irms	2
14	30,027	2.Irms	2
15	30,029	3.Irms	2
16	30,031	A.Irms	2
17	30,033	Ineutral	2
18	30,035	1.Watt	2
19	30,037	2.Watt	2
20	30,039	3.Watt	2
21	30,041	S.Watt	2
22	30,043	1.Var	2
23	30,045	2.Var	2
24	30,047	3.Var	2
25	30,049	S.Var	2
26	30,051	1.VA	2
27	30,053	2.VA	2
28	30,055	3.VA	2
29	30,057	S.VA	2
30	30,059	1.Wh-Import	2
31	30,061	2.Wh-Import	2
32	30,063	3.Wh-Import	2
33	30,065	T.Wh-Import	2
34	30,067	1.Wh-Export	2
35	30,069	2.Wh-Export	2
36	30,071	3.Wh-Export	2
37	30,073	T.Wh-Expt	2
38	30,075	1.VarLh	2
39	30,077	2.VarLh	2
40	30,079	3.VarLh	2
41	30,081	T.VarLh	2
42	30,083	1.VarCh	2
43	30,085	2.VarCh	2
44	30,087	3.VarCh	2
45	30,089	T.VarCh	2
46	30,091	1.Vah	2
47	30,093	2.Vah	2
48	30,095	3.Vah	2
49	30,097	T.Vah	2
50	30,099	IN_KWH1	2
51	30,101	IN_KWH2(opt)	2
52	30,103	Max Demand	2

Read / Write Parameters (Function code – 3 for Read and 6 for Write)

Sr. No.	Address	Config.Parameter	Word	Min Value	Max Value
1	40,101	Password	1	1	9999
2	40,102	Slave Address	1	1	247
3	40,103	*Baud-Rate	1	4800	19200
4	40,104	**Energy type	1	0	9
5	40,105	***System Type	1	0	1
6	40,106	****PF1 Type	1	0	2
7	40,107	****PF2 Type	1	0	2
8	40,108	****PF3 Type	1	0	2
9	40,109	****Total PF Type	1	0	2
10	40,110	#CT Rat – High	1		
11	40,111	#CT Rat – Low	1		
12	40,112	#PT Rat – High	1		
13	40,113	#PT Ratio – Low	1		
14	40,114	##Vrated	1	64	276
15	40,115	##Irated	1	1	5
16	40,116	OUT1PLS/KWH	1	1	9999
17	40,117	IN1PLS/KWH	1	1	9999
18	40,118	IN2PLS/KWH	1	1	9999
19	40,119	@ IN1_Unit	1	0	1
20	40,120	@ IN2_Unit	1	0	1
21	40,121	+Data type	1	0	1
22	40,122	$Demand type	1	0	2
23	40,123	~Demand method	1	0	1
24	40,124	Integration time	1	1	60m
25	40,125	Sub Int. time	1	1	60m
26	40,126	Relay time	1	1	60s
27	40,127	$Power Type	1	0	2
28	40,128	Set Value(high)			
29	40,129	Set Value(low)			
30	40,130	^Unit / Reset	1	0	3

NOTES:

* Baud rate has only three options, 4800,9600,19200, otherwise data error. At read time you will get baud rate index like for 4800,index is 0,for 9600 index is 1 and for 19200 index is 2.But write time you have to give exact value like 4800/9600/19200.
** Energy type has nine options: 0 for KWh-Import,1 forKWh-Export,2 for KVARh-Lag,3 for KVARh-Lead,4 for KVAh,5 for MWh-I,6 for MWh-E,7for MVARh-Lag,8 for MVARh-Lead and 9 for MVAh.
*** system type = 0 for 3p4w and 1 for 3p3w(2E).Don't write.
**** Write command is not allowed for these registers, only read is allowed. If Lag PF, value will be 1, if Lead PF, value will be 2.
# Maximum CT RATIO and PT RATIO value is 9999999 i.e. maximum value is 9999.999 and minimum value is 1000 i.e. 1.000.
Don't change these values. It is only for factory purpose.
@ These parameters for the unit of digital input1 and input2.0 for Kilo and 1 for Mega.
+ Data type has two options. 0-REAL and 1-LONG.
$ Demand/power type – 0 for Kw, 1 for KVA, 2 for KVAR.
~ Demand method 0 for sliding 1 for block.
^ unit / Reset – 0 for 1,1 for Kilo,2 for Mega,3 for Giga
Reset: For reset all parameters enter 85.

Read / Write Parameters (Function code – 3 for Read and 6 for Write)

Sr.No	Address	Calib.Parameter	Words	Min Value	Max Value
1	40,201	1.Vrms_Constant	1	400	999
2	40,202	2.Vrms_Constant	1	400	999
3	40,203	3.Vrms_Constant	1	400	999
4	40,204	1.Watt_Constant	1	8000	24000
5	40,205	2.Watt_Constant	1	8000	24000
6	40,206	3.Watt_Constant	1	8000	24000
7	40,207	1.Var_Constant	1	8000	24000
8	40,208	2.Var_Constant	1	8000	24000
9	40,209	3.Var_Constant	1	8000	24000

3-Phase 3-wire - (REAL)

Read Only Parameters (Function code – 4 supported)

Sr. No.	Address	Measured Para.	Words
1	30,001	Frequency	2
2	30,003	1_2 PF	2
3	30,007	3_2 PF	2
4	30,009	A. PF	2
5	30,011	1_2 Vrms	2
6	30,013	1_3 Vrms	2
7	30,015	3_2 Vrms	2
8	30,017	A.Vrms	2
9	30,025	1.Irms	2
10	30,027	2.Irms	2
11	30,029	3.Irms	2
12	30,031	A.Irms	2
13	30,035	1_2 Watt	2
14	30,039	3_2 Watt	2
15	30,041	S.Watt	2
16	30,043	1_2 Var	2
17	30,047	3_2 Var	2
18	30,049	S.Var	2
19	30,051	1_2 VA	2
20	30,055	3_2 VA	2
21	30,057	S.VA	2
22	30,059	1_2 Wh-mport	2
23	30,063	3_2 Wh-mport	2
24	30,065	T.Wh-Import	2
25	30,067	1_2 Wh-xport	2
26	30,071	3_2 Wh-xport	2
27	30,073	T.Wh-Export	2
28	30,075	1_2 VarLh	2
29	30,079	3_2 VarLh	2
30	30,081	T.VarLh	2
31	30,083	1_2 VarCh	2
32	30,087	3_2 VarCh	2
33	30,089	T.VarCh	2
34	30,091	1_2 VAh	2
35	30,095	3_2 VAh	2
36	30,097	T.VAh	2
37	30,099	IN_KWH1	2
38	30,101	IN_KWH2(opt)	2
39	30,103	Max Demand	2

Read as well as Write Parameters (Function code – 3 for Read and Function code – 6 for Write)

Sr. No.	Address	Config.Parameter	Word	Min Value	Max Value
1	40,101	Password	1	1	9999
2	40,102	Slave Address	1	1	247
3	40,103	*Baud-Rate	1	4800	19200
4	40,104	**Energy type	1	0	9
5	40,105	***System Type	1	0	1
6	40,106	****PF1 Type	1	1	2
7	40,107	****PF2 Type	1	1	2
8	40,108	****PF3 Type	1	1	2
9	40,109	****Total PF Type	1	1	2
10	40,110	#CT Rat – High	1		
11	40,111	#CT Rat – Low	1		
12	40,112	#PT Rat – High	1		
13	40,113	#PT Ratio – Low	1		
14	40,114	##Vrated	1	64	276
15	40,115	##Irated	1	1	5
16	40,116	OUT1PLS/KWH	1	1	9999
17	40,117	IN1PLS/KWH	1	1	9999
18	40,118	IN2PLS/KWH	1	1	9999
19	40,119	@ IN1_Unit	1	0	1
20	40,120	@ IN2_Unit	1	0	1
21	40,121	+Data type	1	0	1
22	40,122	$Demand type	1	0	2
23	40,123	~Demand method	1	0	1
24	40,124	Integration time	1	1	60m
25	40,125	Sub Int. time	1	1	60m
26	40,126	Relay time	1	1	60s
27	40,127	$Power Type	1	0	2
28	40,128	Set Value(high)			
29	40,129	Set Value(low)			
30	40,130	^Unit / Reset	1	0	3

NOTES:

* Baud rate has only three options, 4800,9600,19200, otherwise data error. At read time you will get baud rate index like for 4800,index is 0,for 9600 index is 1 and for 19200 index is 2.But write time you have to give exact value like 4800/9600/19200.
** Energy type has nine options: 0 for KWh-Import,1 forKWh-Export,2 for KVARh-Lag,3 for KVARh-Lead,4 for KVAh,5 for MWh-I,6 for MWh-E,7for MVARh-Lag,8 for MVARh-Lead and 9 for MVAh.
*** system type = 0 for 3p4w and 1 for 3p3w(2E).Don't write.
**** Write command is not allowed for these registers, only read is allowed. If Lag PF, value will be 1, if Lead PF, value will be 2.
# Maximum CT RATIO and PT RATIO value is 9999999 i.e. maximum value is 9999.999 and minimum value is 1000 i.e. 1.000.
Don't change these values. It is only for factory purpose.
@ These parameters for the unit of digital input1 and input2.0 for Kilo and 1 for Mega.
+ Data type has two options. 0-REAL and 1-LONG.
$ Demand/power type – 0 for Kw, 1 for KVA, 2 for KVAR.
~ Demand method 0 for sliding 1 for block.
^ unit / Reset – 0 for 1,1 for Kilo,2 for Mega,3 for Giga
Reset: For reset all parameters enter 85.

Read as well as Write Parameters (Function code – 3 for Read and Function code – 6 for Write)

Sr.No	Address	Calib.Parameter	Words	Min Value	Max Value
1	40,201	1.Vrms_Constant	1	400	999
2	40,202	2.Vrms_Constant	1	400	999
3	40,203	3.Vrms_Constant	1	400	999
4	40,204	1.Watt_Constant	1	8000	24000
5	40,205	2.Watt_Constant	1	8000	24000
6	40,206	3.Watt_Constant	1	8000	24000
7	40,207	1.Var_Constant	1	8000	24000
8	40,208	2.Var_Constant	1	8000	24000
9	40,209	3.Var_Constant	1	8000	24000

3-Phase 4-wire - (LONG)

Read Only Parameters (Function code – 4 supported)

Sr. No.	Address	Measured Para.	Words	MF
1	30,001	Frequency	2	0.1
2	30,003	1.PF	2	0.001
3	30,005	2.PF	2	0.001
4	30,007	3.PF	2	0.001
5	30,009	A.PF	2	0.001
6	30,011	1.Vrms	2	1
7	30,013	2.Vrms	2	1
8	30,015	3.Vrms	2	1
9	30,017	A.Vrms	2	1
10	30,019	Vrms1*2	2	1
11	30,021	Vrms1*3	2	1
12	30,023	Vrms2*3	2	1
13	30,025	1.Irms	2	0.001
14	30,027	2.Irms	2	0.001
15	30,029	3.Irms	2	0.001
16	30,031	A.Irms	2	0.001
17	30,033	Ineutral	2	1
18	30,035	1.Watt	2	1
19	30,037	2.Watt	2	1
20	30,039	3.Watt	2	1
21	30,041	S.Watt	2	1
22	30,043	1.Var	2	1
23	30,045	2.Var	2	1
24	30,047	3.Var	2	1
25	30,049	S.Var	2	1
26	30,051	1.VA	2	1
27	30,053	2.VA	2	1
28	30,055	3.VA	2	1
29	30,057	S.VA	2	1
30	30,059	1.Wh-Import	2	0.0001
31	30,061	2.Wh-Import	2	0.0001
32	30,063	3.Wh-Import	2	0.0001
33	30,065	T.Wh-Import	2	0.0001
34	30,067	1.Wh-Export	2	0.0001
35	30,069	2.Wh-Export	2	0.0001
36	30,071	3.Wh-Export	2	0.0001
37	30,073	T.Wh-Expt	2	0.0001
38	30,075	1.VarLh	2	0.0001
39	30,077	2.VarLh	2	0.0001
40	30,079	3.VarLh	2	0.0001
41	30,081	T.VarLh	2	0.0001
42	30,083	1.VarCh	2	0.0001
43	30,085	2.VarCh	2	0.0001
44	30,087	3.VarCh	2	0.0001
45	30,089	T.VarCh	2	0.0001
46	30,091	1.Vah	2	0.0001
47	30,093	2.Vah	2	0.0001
48	30,095	3.Vah	2	0.0001
49	30,097	T.Vah	2	0.0001
50	30,099	IN_KWH1	2	1
51	30,101	IN_KWH2(opt)	2	1
52	30,103	Max Dem	2	1

Read as well as Write Parameters (Function code – 3 for Read and Function code – 6 for Write)

Sr. No.	Address	Config.Parameter	Word	Min Value	Max Value
1	40,101	Password	1	1	9999
2	40,102	Slave Address	1	1	247
3	40,103	*Baud-Rate	1	4800	19200
4	40,104	**Energy type	1	0	9
5	40,105	***System Type	1	0	1
6	40,106	****PF1 Type	1	0	2
7	40,107	****PF2 Type	1	0	2
8	40,108	****PF3 Type	1	0	2
9	40,109	****Total PF Type	1	0	2
10	40,110	#CT Rat – High	1		
11	40,111	#CT Rat – Low	1		
12	40,112	#PT Rat – High	1		
13	40,113	#PT Ratio – Low	1		
14	40,114	##Vrated	1	64	276
15	40,115	##Irated	1	1	5
16	40,116	OUT1PLS/KWH	1	1	9999
17	40,117	IN1PLS/KWH	1	1	9999
18	40,118	IN2PLS/KWH	1	1	9999
19	40,119	@ IN1_Unit	1	0	1
20	40,120	@ IN2_Unit	1	0	1
21	40,121	+Data type	1	0	1
22	40,122	$Demand type	1	0	2
23	40,123	~Demand method	1	0	1
24	40,124	Integration time	1	1	60m
25	40,125	Sub Int. time	1	1	60m
26	40,126	Relay time	1	1	60s
27	40,127	$Power Type	1	0	2
28	40,128	Set Value(high)			
29	40,129	Set Value(low)			
30	40,130	^Unit / Reset	1	0	3

NOTES:

* Baud rate has only three options, 4800,9600,19200, otherwise data error. At read time you will get baud rate index like for 4800,index is 0,for 9600 index is 1 and for 19200 index is 2.But write time you have to give exact value like 4800/9600/19200.
** Energy type has nine options: 0 for KWh-Import,1 forKWh-Export,2 for KVARh-Lag,3 for KVARh-Lead,4 for KVAh,5 for MWh-I,6 for MWh-E,7for MVARh-Lag,8 for MVARh-Lead and 9 for MVAh.
*** system type = 0 for 3p4w and 1 for 3p3w(2E).Don't write.
**** Write command is not allowed for these registers, only read is allowed. If Lag PF, value will be 1, if Lead PF, value will be 2.
# Maximum CT RATIO and PT RATIO value is 9999999 i.e. maximum value is 9999.999 and minimum value is 1000 i.e. 1.000.
Don't change these values. It is only for factory purpose.
@ These parameters for the unit of digital input1 and input2.0 for Kilo and 1 for Mega.
+ Data type has two options. 0-REAL and 1-LONG.
$ Demand/power type – 0 for Kw, 1 for KVA, 2 for KVAR.
~ Demand method 0 for sliding 1 for block.
^ unit / Reset – 0 for 1,1 for Kilo,2 for Mega,3 for Giga
Reset: For reset all parameters enter 85.

Read as well as Write Parameters (Function code – 3 for Read and Function code – 6 for Write)

Sr.No	Address	Calib.Parameter	Words	Min	Max
1	40,201	1.Vrms_Constant	1	400	999
2	40,202	2.Vrms_Constant	1	400	999
3	40,203	3.Vrms_Constant	1	400	999
4	40,204	1.Watt_Constant	1	8000	24000
5	40,205	2.Watt_Constant	1	8000	24000
6	40,206	3.Watt_Constant	1	8000	24000
7	40,207	1.Var_Constant	1	8000	24000
8	40,208	2.Var_Constant	1	8000	24000
9	40,209	3.Var_Constant	1	8000	24000

3-Phase 3-wire - (LONG)

Read Only Parameters (Function code – 4 supported)

Sr. No.	Address	Measured Para.	Words	MF
1	30,001	Frequency	2	0.1
2	30,003	1_2 PF	2	0.001
3	30,007	3_2 PF	2	0.001
4	30,009	A. PF	2	0.001
5	30,011	1_2 Vrms	2	1
6	30,013	1_3 Vrms	2	1
7	30,015	3_2 Vrms	2	1
8	30,017	A.Vrms	2	1
9	30,025	1.Irms	2	0.001
10	30,027	2.Irms	2	0.001
11	30,029	3.Irms	2	0.001
12	30,031	A.Irms	2	0.001
13	30,035	1_2 Watt	2	1
14	30,039	3_2 Watt	2	1
15	30,041	S.Watt	2	1
16	30,043	1_2 Var	2	1
17	30,047	3_2 Var	2	1
18	30,049	S.Var	2	1
19	30,051	1_2 VA	2	1
20	30,055	3_2 VA	2	1
21	30,057	S.VA	2	1
22	30,059	1_2 Wh-Im	2	0.0001
23	30,063	3_2 Wh-im	2	0.0001
24	30,065	T.Wh-Imp	2	0.0001
25	30,067	1_2 Wh-Ex	2	0.0001
26	30,071	3_2 Wh-Ex	2	0.0001
27	30,073	T.Wh-Exp	2	0.0001
28	30,075	1_2 VarLh	2	0.0001
29	30,079	3_2 VarLh	2	0.0001
30	30,081	T.VarLh	2	0.0001
31	30,083	1_2 VarCh	2	0.0001
32	30,087	3_2 VarCh	2	0.0001
33	30,089	T.VarCh	2	0.0001
34	30,091	1_2 VAh	2	0.0001
35	30,095	3_2 VAh	2	0.0001
36	30,097	T.VAh	2	0.0001
37	30,099	IN_KWH1	2	1
38	30,101	IN_KWH2	2	1
39	30,103	Max Dem	2	1

Read as well as Write Parameters (Function code – 3 for Read and Function code – 6 for Write)

Sr. No.	Address	Config.Parameter	Word	Min Value	Max Value
1	40,101	Password	1	1	9999
2	40,102	Slave Address	1	1	247
3	40,103	*Baud-Rate	1	4800	19200
4	40,104	**Energy type	1	0	9
5	40,105	***System Type	1	0	1
6	40,106	****PF1 Type	1	1	2
7	40,107	****PF2 Type	1	1	2
8	40,108	****PF3 Type	1	1	2
9	40,109	****Total PF Type	1	1	2
10	40,110	#CT Rat – High	1		
11	40,111	#CT Rat – Low	1		
12	40,112	#PT Rat – High	1		
13	40,113	#PT Ratio – Low	1		
14	40,114	##Vrated	1	64	276
15	40,115	##Irated	1	1	5
16	40,116	OUT1PLS/KWH	1	1	9999
17	40,117	IN1PLS/KWH	1	1	9999
18	40,118	IN2PLS/KWH	1	1	9999
19	40,119	@ IN1_Unit	1	0	1
20	40,120	@ IN2_Unit	1	0	1
21	40,121	+Data type	1	0	1
22	40,122	$Demand type	1	0	2
23	40,123	~Demand method	1	0	1
24	40,124	Integration time	1	1	60m
25	40,125	Sub Int. time	1	1	60m
26	40,126	Relay time	1	1	60s
27	40,127	$Power Type	1	0	2
28	40,128	Set Value(high)			
29	40,129	Set Value(low)			
30	40,130	^Unit / Reset	1	0	3

NOTES:

* Baud rate has only three options, 4800,9600,19200, otherwise data error. At read time you will get baud rate index like for 4800,index is 0,for 9600 index is 1 and for 19200 index is 2.But write time you have to give exact value like 4800/9600/19200.
** Energy type has nine options: 0 for KWh-Import,1 forKWh-Export,2 for KVARh-Lag,3 for KVARh-Lead,4 for KVAh,5 for MWh-I,6 for MWh-E,7for MVARh-Lag,8 for MVARh-Lead and 9 for MVAh.
*** system type = 0 for 3p4w and 1 for 3p3w(2E).Don't write.
**** Write command is not allowed for these registers, only read is allowed. If Lag PF, value will be 1, if Lead PF, value will be 2.
# Maximum CT RATIO and PT RATIO value is 9999999 i.e. maximum value is 9999.999 and minimum value is 1000 i.e. 1.000.
Don't change these values. It is only for factory purpose.
@ These parameters for the unit of digital input1 and input2.0 for Kilo and 1 for Mega.
+ Data type has two options. 0-REAL and 1-LONG.
$ Demand/power type – 0 for Kw, 1 for KVA, 2 for KVAR.
~ Demand method 0 for sliding 1 for block.
^ unit / Reset – 0 for 1,1 for Kilo,2 for Mega,3 for Giga
Reset: For reset all parameters enter 85.

Read as well as Write Parameters (Function code – 3 for Read and Function code – 6 for Write)

Sr.N	Address	Calib.Parameter	Words	Min	Max
1	40,201	1.Vrms_Constant	1	400	999
2	40,202	2.Vrms_Constant	1	400	999
3	40,203	3.Vrms_Constant	1	400	999
4	40,204	1.Watt_Constant	1	8000	24000
5	40,205	2.Watt_Constant	1	8000	24000
6	40,206	3.Watt_Constant	1	8000	24000
7	40,207	1.Var_Constant	1	8000	24000
8	40,208	2.Var_Constant	1	8000	24000
9	40,209	3.Var_Constant	1	8000	24000